

This listing of claims will replace all prior versions and listings of claims in the application:

**Listing of Claims:**

1. (Currently amended): A method for fabricating a semiconductor device, comprising the steps of:

depositing a fluorine-containing organic film on a semiconductor substrate using a material gas containing fluorocarbon as a main component in a reactor chamber of a plasma processing apparatus; and

after the depositing step, directly introducing a rare gas including no fluorocarbon into the reactor chamber, in which the semiconductor substrate is provided, to generate a plasma of the rare gas in the reactor chamber; and

densifying the fluorine-containing organic film by directly exposing the fluorine-containing organic film to a the plasma of a rare gas including no fluorocarbon thereby heating the fluorine-containing organic film in the same reactor chamber,

wherein the fluorocarbon is  $C_5F_8$ ,  $C_3F_6$ , or  $C_4F_6$ .

2. (original): The method for fabricating a semiconductor device of claim 1, wherein the step of depositing a fluorine-containing organic film includes the step of depositing the fluorine-containing organic film while cooling the semiconductor substrate.

3. (original): The method for fabricating a semiconductor device of claim 1, wherein the step of densifying the fluorine-containing organic film includes the step of exposing the fluorine-containing organic film to the plasma of a rare gas in a state where the semiconductor substrate has moved toward a plasma generation region in the reactor chamber.

4. (previously canceled)

5. (original): The method for fabricating a semiconductor device of claim 1, wherein the rare gas is Argon gas.

6. (Currently amended): A method for fabricating a semiconductor device comprising the steps of:

forming a mask pattern made of a resist film or an insulating film on a metal film deposited on a semiconductor substrate;

dry-etching the metal film using the mask pattern to form a plurality of metal interconnections made of the metal film;

depositing an interlayer insulating film made of a fluorine-containing organic film between the plurality of metal interconnections and on top surfaces of the metal interconnections using a material gas containing fluorocarbon as a main component in a reactor chamber of a plasma processing apparatus; and

after the depositing step, directly introducing a rare gas including no fluorocarbon into the reactor chamber, in which the semiconductor substrate is provided, to generate a plasma of the rare gas in the reactor chamber; and

densifying the fluorine-containing organic film by directly exposing the fluorine-containing organic film to a the plasma of a rare gas including no fluorocarbon thereby heating the fluorine-containing organic film in the same reactor chamber,

wherein the fluorocarbon is  $C_5F_8$ ,  $C_3F_6$ , or  $C_4F_6$ .

7. (original): The method for fabricating a semiconductor device of claim 6, wherein the step of forming a mask pattern includes the steps of:

depositing the insulating film on the metal film;

forming a resist pattern on the insulating film; and

dry-etching the insulating film using the resist pattern to form the mask pattern, and the step of dry-etching the insulating film is performed in the same reactor chamber.

8. (previously canceled)

9. (original): The method for fabricating a semiconductor device of claim 6, wherein the rare gas is argon gas.